PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Noriaki IKENAGA, et al.

Appln. No.: 10/062,405

Confirmation No.: 4115

Filed: February 05, 2002

Docket No: Q68355

Group Art Unit: 1763

Examiner: Anna M. CROWELL

For: METHOD AND APPARATUS FOR MODIFYING SURFACE OF CONTAINER MADE OF POLYMERIC COMPOUND

SUBMISSION OF APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an Appeal Brief. A check for the statutory fee of $500.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

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WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: May 25, 2005

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For: METHOD AND APPARATUS FOR MODIFYING SURFACE OF CONTAINER MADE OF POLYMERIC COMPOUND

PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. § 1.136

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. § 1.136, Applicant hereby petitions for an extension of time of one month(s), extending the time for responding to the Office Action of February 3, 2005 to May 25, 2005.

A check for the statutory fee of $120.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

05/26/2005 JADD01 00000027 10062405

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Examiner: Anna M. CROWELL

For: METHOD AND APPARATUS FOR MODIFYING SURFACE OF CONTAINER MADE OF POLYMERIC COMPOUND

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

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I. REAL PARTY IN INTEREST

Based on information supplied by Appellant and to the best knowledge of the Appellant's legal representative, the real parties in interest are the assignees, SHIBUYA KOGYO CO., LTD. and KANAZAWA INSTITUTE OF TECHNOLOGY, by virtue of an Assignment recorded on February 5, 2002 at Reel 012570, Frame 0459.

II. RELATED APPEALS AND INTERFERENCES

Upon information and belief, there are no other prior or pending appeals, interferences, or judicial proceedings known to Appellant, Appellant's representative or the assignee that may be related to, be directly affected by, or have a bearing on the Board of Patent Appeal and Interferences' ("Board") decision on this appeal.

III. STATUS OF CLAIMS

The application was filed with claims 1-13. During prosecution, claims 1-4 and 8-9 were withdrawn. For the purposes of appeal, the status of the claims is as follows:

1. Claims 5-7, 10, 12 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Plester (WO 95/22413) in view of Denholm *et al.* (U.S. 5,911,832) or Liebert *et al.* (U.S. 6,020,592).

2. Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Plester in view of Denholm as applied to claims 5-7, 10, 12 and 13 in further view of Hayashi *et al.* (U.S. 5,578,130), or, alternatively, over Plester in view of Liebert as applied to claims 5-7, 10, 12 and 13 in further view of Hayashi.

IV. STATUS OF AMENDMENTS

The Amendment filed June 1, 2004 has been entered and considered. A Response without amendments was filed on December 28, 2004. Therefore, all amendments to the claims that were made during the prosecution of the present application have been entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention relates to an apparatus for modifying the surface of a container made of a polymeric compound, and more particularly relates to an apparatus for modifying the interior surface of, *e.g.*, a PET (polyethylene terephthalate) container into a material having low permeability to gases, *e.g.*, diamond-like carbon. Specification at p. 1, lines 11-16.

The claimed subject matter is an apparatus 1 for modifying a surface of a container 2made of a polymeric compound. The claimed apparatus 1 includes

1. a reception chamber 3 adapted for receiving the container 2 while maintaining airtightness;
2. a vacuum pump 11 for evacuating the reception chamber 3;
3. a plasma generating unit, which, in one embodiment, is constituted by coil 6, matching circuit 17 and high frequency power source 18, (specification at p. 10, lines 21-23) for generating plasma in reception chamber 3;
4. an electrode 5 adapted for being inserted into said container 2; and
5. a high voltage power source 15 for applying high voltage pulses to electrode 5.

See FIGS. 1-2; claim 5. The claimed apparatus is configured to implant ions in the generated plasma into the interior surface of container 2 to thereby modify the interior surface layer of container 2 into a material that is not readily permeable by gases, particularly carbon dioxide and oxygen. *See* claim 5.

One embodiment of a modifying apparatus 1 consistent with claim 5 is shown in FIGS. 1-3. This exemplary embodiment of modifying apparatus 1 includes has a cup-like reception chamber 3 made of a conductive material and electrically connected to a constant voltage body, *e.g.*, the ground, that can receive container 2, a cover 4 for closing a top opening of reception

chamber 3, electrode 5 provided in cover 4, a coil 6 disposed in an inner circumferential portion of reception chamber 3, and a solenoid coil 7 disposed to surround reception chamber 3 and coil 6. Specification at p. 6, lines 5-11; FIGS. 1-2. Container 2 having a surface to be modified by modifying apparatus 1 is, in one embodiment, a PET container designed for containing liquids, *e.g.*, beverages. Specification at p. 6, lines 12-25.

A suction port 3A is formed in a position close to the top portion of chamber 3. Specification at p. 7, lines 4-5; FIG. 2. One end of a conduit 8 is connected to the suction port 3A, while the other end of conduit 8 is connected to a vacuum pump 11. Specification at p. 7, lines 6-8. An electromagnetic on-off valve 13, controlled by control unit 14, is provided in the middle of conduit 8. Specification at p. 7, lines 8-9. When valve 13 is opened by control unit 14, reception chamber 3 is evacuated through conduit 8 and suction port 3A. Specification at p. 7, lines 12-16.

Cover 4 is made of a conductive material formed into a disc-like shape. *See* FIG. 2. A through hole 4A is formed at a center portion of cover 4. When cover 4 is mounted on the top opening portion of reception chamber 3 to thereby close reception chamber 3, airtightness is maintained between a top opening portion of reception chamber 3 and cover 4. Specification at p. 8, lines 2-5.

In this embodiment, electrode 5 is made of a conductive pipe and is electrically connected to a DC high voltage power source 15. Specification at p. 8, lines 6-9; FIGS. 1-2. The upper end portion of electrode 5 projects over the upper surface of cover 4. FIG. 2; Specification at p. 8, lines 9-10. One end of a conduit 16 is connected to the upper end portion of the electrode 5 with the other end of conduit 16 connected to a gas supply source 12. In this embodiment, argon gas is reserved in the gas supply source 12. Specification at p. 8, lines 9-10.

An electromagnetic on-off valve 21 is provided in the middle of conduit 16 and controlled by control unit 14. Specification at p. 8, lines 13-19. When valve 21 is opened by the control unit 14, gas, *e.g.*, argon gas, is supplied into reception chamber 3 from supply source 12 through conduit 16. Specification at p. 7, lines 16-20. Thus, in this embodiment, electrode 5 serves as a gas introduction tube.

The operation of the DC high voltage power source 15 connected to electrode 5 is controlled by control unit 14 and designed to apply positive high voltage pulses to electrode 5. Specification at p. 9, line 22 to p., lines 2.

The coil 6 provided in the inner circumferential portion of the reception chamber 3 (*see* FIG. 1) is electrically insulated from the reception chamber 3. Specification at p. 7, lines 6-8. Coil 6 is connected to a high frequency power source 18, which is also controlled by control unit 14, through a matching circuit 17 disposed outside reception chamber 3. Specification at p. 10, lines 6-11. High frequency power source 18 is designed to apply a high frequency current ranging from several of MHz to several hundreds of MHz to coil 6 when an operating instruction is transmitted from control unit 14 to high frequency power source 18. Specification at p. 10, lines 11-15.

Further, the solenoid coil 7 disposed to surround reception chamber 3 is connected to a not-shown power source. Specification at p. 10, lines 16-17. When an operating instruction is transmitted from the control unit 14 to the power source, the solenoid coil 7 is excited to generate a DC magnetic field. Specification at p. 10, lines 17-20.

Once container 2 is placed in reception chamber 3, the reception chamber is evacuated through conduit 8 and argon gas is supplied to the internal space of the reception chamber, including the internal space of container 2, through conduit 16 and electrode 5. Specification at

p. 9, lines 6-11. Next, control unit 14 allows current flow into solenoid coil 7, thereby exciting solenoid coil 7 and creating a magnetic field in the internal space of reception chamber 3. Specification at p. 11, lines 16-20.

Control unit 14 then opens valve 21 provided in conduit 16 for a predetermined period of time, thereby introducing argon gas is introduced into the internal space of container 2 through the conduit 16. Specification at p. 12, lines 1-6. Control unit 14 then transmits instruction to high frequency power source 18 so that a high frequency current ranging from several of MHz to several hundreds of MHz is applied from to coil 6 by high frequency power source, thereby generating plasma in reception chamber 3. Specification at p. 11, lines 8-13. Control unit 14 next transmits instructions to high voltage power source 15 to apply a series of positive high voltage pulses from high voltage power source 15 to electrode 5. Specification at p. 12, lines 14-19. Thus, ions of the plasma inside container 2 are implanted into the interior of container 2.

In this embodiment, ions are implanted thus into the whole area of the interior surface of container 2. Specification at p. 14, lines 12-14. Accordingly, the material itself of the interior surface of container 2 originally containing carbon are modified into diamond-like carbon ("DLC") throughout (*see* FIG. 4). That is, in this embodiment, the original surface of container 2 is not coated with DLC, but the material itself of the surface of the PET container 2 is modified into DLC so that a DLC layer 22 is formed all over the interior side surface as shown on the right of FIG. 4. Specification at p. 14, line 22 to p. 15, line 6.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are being appealed:

1. Claims 5-7, 10, 12 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Plester in view of Denholm or Liebert.

2. Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Plester in view of Denholm as applied to claims 5-7, 10, 12 and 13 in further view of Hayashi , or, alternatively, over Plester in view of Liebert as applied to claims 5-7, 10, 12 and 13 in further view of Hayashi.

It is respectfully submitted that all the pending claims are patentable for at least the reasons that follow.

VII. ARGUMENT

The Examiner has rejected claims 5-7, 10, 12 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Plesterin view of Denholm or Liebert. The Examiner has rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Plester in view of Denholm as applied to claims 5-7, 10, 12 and 13 in further view of Hayashi, or, alternatively, over Plester in view of Liebert as applied to claims 5-7, 10, 12 and 13 in further view of Hayashi. Claim 5 is the only pending independent claim with claims 6-7 and 10-13 depending therefrom.

Appellant respectfully submits that the Examiner's combination of references is improper as the Examiner has failed to articulate a credible basis for combining the teachings of the cite art as advanced in the September 28, 2004 Final Office Action ("Office Action"). Appellant further asserts that, even if combined as suggested by the Examiner, the combination of cited art fails to teach or suggest an apparatus as recited in claim 5.

1. The September 28, 2004 Final Office Action

Regarding the Plester reference, the Examiner asserts that

> Referring to Figures 1 and 2, page 8, line 19-page 9, line 12, and page 10, line 2-page 13, line 17, Plester discloses an apparatus for modifying a surface of a container made of a polymeric compound comprising: a reception chamber 1 adapted for receiving the container 2 while keeping airtightness; a vacuum pump for evacuating the reception chamber 1 (pg 11, line 35-page 12, line 2); a plasma generating unit 6 for generating plasma in the reception chamber 1 (pg 10, lines 11-13); an electrode 3 adapted for being inserted into the container 2 received in the reception chamber 1 (pg 10, lines 11-16); and a high voltage power source 6 for applying high voltage to the electrode (pg 10, lines 11-16); wherein an interior side surface layer of the container received in the reception chamber is modified into a material that is not permeable (pg. 9, lines 3-12, pg. 13, lines 4-17, and claims 28-29).
>
> Regarding the claim limitation of a material that is not permeable by carbon dioxide gas and oxygen or a material that is hard to be permeated by carbon dioxide gas and oxygen, it should be noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention

> from the prior art. See In re Casey, 152 USPQ 235 (CCPA 1967) and In re Otto, 136 USPQ 458, 459 (CCPA 1963). Thus, since the interior side surface layer of Plester is an inert or impermeable material, the apparatus of Plester is capable of not being permeated by or hard to be permeated by carbon dioxide gas and oxygen.

Office Action at p. 3-4.

The Examiner acknowledges, however, that Plester fails to teach applying high voltage positive pulses to the electrode and an apparatus that implants ions into an interior side surface of the container. Office Action at p. 3. To overcome this deficiency in Plester, the Examiner separately relies on Denholm and Liebert. With respect to the teachings of Denholm and Liebert, the rejection states:

> Referring to column 4, line 3-column 5, line 40 of Denholm et al. or column 4, lines 50-57 and column 5, lines 12-33 of Liebert et al., Denholm et al. or Liebert et al. discloses an apparatus that applies high voltage positive pulses to an electrode inside of the chamber in order to accelerate (implant) ions into the substrate with the desired depth and dose of impurity material (col. 4, lines 33-38 of Denholm et al., col. 5, lines 22-30 of Liebert et al.). Additionally, since it is well established in the art that a substrate is merely the material that is processed or worked upon by the apparatus, the substrate in the instant application is simply the interior side surface of the container. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to apply high voltage positive pulses to the electrode inside of the container of Plester as taught by Denholm et al. or Liebert et al in order to accelerate ions into the interior side surface of the container with the desired depth and dose of impurity material.

Office Action at p. 4. For at least the following reasons, Appellant respectfully disagrees.

2. <u>There is No Credible Motivation to Combine the Cited References</u>

To overcome the admitted deficiencies in Plester, the Examiner separately relies on the teachings of Denholm and Liebert. Plester relates to a method of coating the inner surface of a container by use of a metal gas tube 3. *See* Fig. 1. Denholm relates to a method of treating a wafer surface, *e.g.*, a semiconductor chip, by causing ions to impact a surface of the wafer. Abstract, col. 1, lines 18-37; Fig. 1. Similarly, Liebert relates to a doping apparatus for

semiconductor chips. Abstract; Fig. 1. The Examiner's asserted motivation for this combination of references is "to apply high voltage positive pulses to the electrode inside of the container of Plester as taught by Denholm et al. or Liebert et al. in order to accelerate ions into the interior side of the surface of the container with the desired depth and dose of impurity material." Office Action at p. 4. The Examiner, however, does not identify where this alleged motivation can be found in any of the cited references.

To establish a *prima facie* case of obviousness, three basic criteria must be met:

1. there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
2. there must be a reasonable expectation of success; and
3. the prior art reference (or references when combined) must teach or suggest all the claim limitations.

MPEP 2143. The teaching or suggestion to make the claimed combination must be found in the prior art, not in Appellant's disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991); MPEP 2143.

Here, the Examiner has impermissibly combined references based on a alleged motivation that can come only from the Appellant's disclosure. The Plester reference is directed to a method of coating the interior of a container to provide enhanced barrier properties. *See* pp. 3-6. As Plester envisions these containers to be used in food and beverage applications (*see* pp. 1-3), those of ordinary skill in the art would understand that there is no particular need to achieve exceedingly uniform coatings. Indeed, there is no mention of any problem associated with the uniformity of coatings mentioned in Plester. Thus, the Examiner's asserted motivation for modifying Plester according to Denholm or Liebert does not come from the prior art, but is,

instead, an unsupported assertion used to justify the otherwise hindsight reconstruction of the Appellant's invention.

Indeed, the Examiner's asserted motivation is contradicted by the express teachings of Denholm. In Denholm, it is taught that "[g]ood treatment uniformity is obtained by keeping the gas density in the region 34 between the manifold [32] and the workpiece 14 as uniform as possible." Col. 4, lines 19-21. This uniformity of gas density is achieved by providing a manifold 32 that is circular in plan and has an array of openings. Col. 4, lines 21-25. However, modifying the Plester apparatus according to the teachings of Denholm would fail to result in a uniform gas density near the interior surface of the container as required by Denholm due to the irregularity of container 2 in relationship to gas tub 3. *See* Plester Fig. 1. Thus, while Denholm suggests uniform treatment of the surface of a semiconductor chip (a notably distinct technological field from food and beverage containers), combing the references as asserted by the Examiner would destroy the uniformity of gas density required by Denholm and, thus, the Examiner's motivation of ion implantation of "the desired depth and dose of impurity material" would not be achieved even if the references are combined as suggested by the Examiner.

Further, one embodiment of Denholm includes an ultraviolet light source 102 that allows ultraviolet light to pass between manifold 32 and platen 30 by entering the chamber through a window 104. *See* Fig. 1A; col. 5, lines 52-60. To modify the Denholm apparatus so that manifold 32 was located inside a container while platen 30 was outside the container would impermissibly destroy this key embodiment.

3. The Examiner's Suggested Combination of Prior Art Fails to Teach of Suggest each Element of Claim 5

Appellant's invention involves the ***modification*** of the interior surface of the container, as opposed to ***coating*** the container. For example, Appellant's specification states:

> In this embodiment, ions are implanted thus into the whole area of the interior side surface of the PET container 2. Accordingly, the material itself of the interior side surface of the PET container 2 originally containing carbon are modified into DLC (diamond-like carbon) throughout (see Fig. 4). That is, in this embodiment, the original surface of the PET container 2 is not coated with DLC but the material itself of the surface of the PET container 2 is modified into DLC so that a DLC layer 22 is formed all over the interior side surface as shown on the right of Fig. 4.

Specification at page 13. *See also* Appellant's specification at page 26, line 23 to page 27, line 2. Appellant's claim 5 as amended recites the feature of ***modifying*** the interior side surface of the container through ion implantation. Plester, on the other hand, certainly does not teach or suggest this feature.

The grounds of rejection do not assert that the system for forming an inert/impermeable surface disclosed in Plester actually ***modifies*** a portion of the inside of the container being treated. Indeed, Plester emphasizes ***coating*** the inside surface of the container. *See, e.g.*, Plester at page 5, lines 10-27; page 7, lines 16-24; page 12, lines 29-32.

Clearly, therefore, Plester does not teach or even hint at a device that implants ions into the interior side surface of the container so as to modify the interior side surface, as recited in the claim 5. To the contrary, the objective of Plester is to deposit a thin polymer ***coating*** on the surface (*see, e.g.,* the abstract). Plester explains that the internal surface of the container is changed by surface reaction or surface activation (*see* page 13, lines 4 to 17). However, Plester makes clear that "free radicals formed thereby are induced at the inner surface of the container before the reactant gases are introduced. After cleaning and surface activation ... provides in situ plasma assisted polymerization." Plester at p. 10, line 23 to page 11, line 4. This means, surface activation is induced before the coating. However, there is no description that the inner surface of the container is modified into a material that is not permeable through surface activation. Rather, referring to p. 11, lines 5-14 of Plester, the polymer ***coating*** makes the material non-

permeable. Moreover, in making the material non-permeable, there is no suggestion in Plester of implanting ions as recited in claim 5.

Further, neither Denholm nor Liebert can implant ions to the interior side surface of the container even if a container is disposed on a plate. In the ordinary plasma density as used in Denholm and Liebert, since the normal diameter of the mouth of the PET container is not larger than 2 cm, the plasma outside of the PET container cannot connect to the interior side thereof. That is, even if the positive high voltage is applied to the positive electrode, the positive high voltage is not applied to the plasma in the interior side of the PET container. Thus, neither Denholm nor Liebert cannot implant ions to the interior side surface of the container.

Still further, in Plester, the electrode inserted into the container merely generates plasma by discharging supplied RF power. That is, Plester does not teach or suggest applying high voltage pulses to the electrode so as to make the plasma in the interior side of the container into positive high voltage. Thus, Plester cannot implant ions to the interior side surface of the container.

Thus, Appellant submits that Plester in view of Denholm or Liebert does not teach or suggest inserting the electrode to which the positive high voltage pulses are applied so as to change the plasma in the interior side of the container. That is, Plester in view of Denholm or Liebert cannot "implant ions to the interior side surface of the container" as recited in claim 5 of the application.

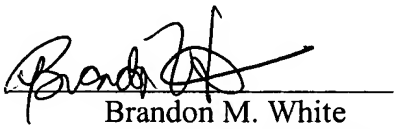
Claims 6-7, 10 and 12-13 depend on claim 5 and are therefore patentable for at least the reasons presented above with respect to claim 5. In view of the foregoing distinctions, Appellant respectfully request the Board to withdraw the rejection of claims 5-7, 10 and 12-13. As claim 11 depends on claim 5, and as the Hayashi reference fails to cure the deficiencies of Plester,

Denholm and Liebert discussed above with respect to claim 5, Appellant submits that claim 11 is patentable over the cited references at least based on this dependency.

VIII. CONCLUSION

Unless a check is submitted herewith for the fee required under 37 C.F.R. §41.37(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: May 25, 2005

CLAIMS APPENDIX

CLAIMS 5-7 AND 10-13 ON APPEAL:

5. (previously presented): An apparatus for modifying a surface of a container made of a polymeric compound comprising:

a reception chamber adapted for receiving said container while keeping airtightness;

a vacuum pump for evacuating said reception chamber;

a plasma generating unit for generating plasma in said reception chamber;

an electrode adapted for being inserted into said container received in said reception chamber; and

a high voltage power source for applying high voltage pulses to said electrode;

wherein said apparatus implants ions in the generated plasma into an interior side surface of the container received in said reception chamber and modifies the interior side surface layer of said container into a material that is not permeable by carbon dioxide gas and oxygen or a material that is hard to be permeated by carbon dioxide gas and oxygen.

6. (original): An apparatus for modifying a surface of a container made of a polymeric compound according to claim 5, further comprising a magnetic field generating unit for generating a magnetic field in said reception chamber.

7. (original): An apparatus for modifying a surface of a container made of a polymeric compound according to claim 6, further comprising a gas supply source for supplying gas into said reception chamber.

10. (original): An apparatus for modifying a surface of a container made of a polymeric compound according to claim 6, wherein said high voltage power source also serves as said plasma generating unit.

11. (previously presented): An apparatus for modifying a surface of a container made of a polymeric compound according to claim 6, wherein said magnetic field generating unit includes one of a solenoid coil provided to surround said reception chamber and a plurality of permanent magnets disposed to surround said reception chamber.

12. (original): An apparatus for modifying a surface of a container made of a polymeric compound according to claim 5, wherein said high voltage power source applies positive high voltage pulses to said electrode.

13. (original): An apparatus for modifying a surface of a container made of a polymeric compound according to claim 5, wherein said container made of a polymeric compound is one of a container made of polyethylene terephthalate and a container made of synthetic resin.